

# collage

# 1



Mariner IV is rapidly approaching the age of, say, a Bertrand Russell or a Georgie Jessel. And like those venerable oracles; it still continues to function nicely. While JPL, NASA, and some others deserve at least a *little* of the credit, our Aerospace Center geniuses would dissolve in tears if we didn't tell you that they built the on-board Transponder and Flight Command Subsystem, as well as r-f subsystems for the ground stations, that have had a whole lot to do with the geriatric heroics of that never-say-die space probe—at least in terms of communications. When you consider that Mariner IV was projected toward Mars on 11/28/64, has transmitted useful data from as far out as 206,000,000 miles, is now (1/67) operating effectively with signal strength as low as  $10^{-18}$  watt, and is closing in on the two-billion mile mark of space travel, you'll well understand why our special consultant in charge of Planned Obsolescence considers such reliability a horrendous crime. What he means is, where's the market for repeat business?



## Bird-watchers delight

...now an off-the-shelf item

You should be pleased to know that now you can have immediate delivery on our Aerospace Center's series

of MCR-150 solid-state command receivers. These are the kind that have performed flawlessly on most of today's second generation missiles for command and destruct functions. They're small, light, reliable, off-the-shelf and you can specify up to 20 channels. Anyway, if you're in the market for this sort of thing, remember no one makes a unit that even comes close to ours in terms of proven performance, dependability and price.



Some of the far-out R&D types at our Aerospace Center have been fooling (creatively) with bulk-effect devices including development of acoustic delay lines well into the gigahertz frequency range. They define an acoustic delay line as consisting of an acoustic propagation medium together with suitable transducers to perform a linear transduction of energy between electric and acoustic energy at the input and output terminals. Even if that sounds like gibberish to you, but you're in the business of designing computing systems of most any sort, this should be of great interest to you. Right now, we're talking in terms of 5 to 10 microsecond delays, but there's no telling where it will all end. We'll keep you posted if you'll write for more details.

Write to the Aerospace Center if you'd like to be deluged with more information.

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# collage 2



## A side-looking cigar

You've probably seen pictures of the Army's Mohawk surveillance aircraft. Actually, it's the Grumman OV-1A and it's doing well in places like Viet Nam. Anyway, that cigar-shaped thing underneath the aircraft contains some pretty far-out Motorola hardware. It's part of our Aerospace Center's APS-94 side-looking (with moving target indicating capability) radar system. Among other things, this system provides real-time, permanent imagery of what's going on alongside the aircraft and data can be transmitted to nearby ground stations . . . immediately . . . for appropriate action. We might add that it works at night and under what you might consider impossible weather conditions. Unless you're working for the wrong side, write us for details. Such a system might work on *your* plane. Motorola is an equal opportunity vendor. Write to the appropriate Center about things discussed here and see if we won't sell you some.



## 'Tis better to receive

... with CM 610 & 620's

Our Chicago Center would be delighted to sell you at least a gross of their new UHF and VHF air traffic control communications receivers. They are called, respectively, CM 610's and CM 620's. Both are very small, solid-state, double-conversion, fixed-tuned, crystal-controlled super-heterodyne receivers for A-M (or even p.m., yet) reception. Also, they don't cost very much. If they won't do the job for you, nothing will. But for skeptics, we'll send more data.

**DOUBTERS, BELIEVE US!**  
(or remain forever unprintable)



We've heard rumors that there are still a few of you out there in magazineland who claim to have modern computing and/or data communications systems and do **not** have the world's most incredible output device, the Motorola TP-4000. Since most smart people are skeptical of advertisements, maybe you didn't believe us the first time we described the specs. So here, again, are a few of them: The TP-4000 is a very tiny and absolutely silent, non-impact, solid-state, 3000 wpm printer. If you have a time-shared system, a bunch of TP-4000's would serve you well. Also, they are very nice for complex, real-time data communications system (for business, industrial, and military applications) . . . wherever you need instantaneous, hard-copy readout (8 1/2" wide, 80 characters per line) of what's going on. We have reams of literature we'd like to send, if you'd only write our Chicago Center. But this may be your last chance, you doubting hard-noses. From now on we'll let you grovel for one.

Write to the appropriate Center if you'd like to be deluged with more information.

.....  
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 : .....



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**Government Electronics Division**



# collage

# 3

Now IC's with  
a MTBF  
of 30 seconds



What's more they're unconditionally guaranteed for the life of the system. Exotic circuits with a limited application? Hardly. We are building them into a device which we expect to produce by the thousands and to sell at a price that makes it as expendable as a Kleenex.

These integrated circuits are a part of our new proximity mortar fuze and they make it smaller, lighter, cheaper, rugged, and reliabler than any previous design. If an IC proximity fuze could improve your ☐ product, ☐ job, ☐ life, give us a call.



## Motorola, the sweetheart of Sigmund Freud

We're getting reports that many of you are developing facial tics, twitches and other nervous habits we'd rather not mention simply because you can't find a decent way to multiplex your radar signals. Well, let Motorola, friend of the overwrought engineer, relieve your anxieties with our new solid-state Radar Relay Multiplex. If, indeed, you are concerned with remoting

radar data, the new Motorola system is being used for relaying things like composite video, azimuth change pulses, system trigger, slant height video, synchro signals, IFF video, slant operational video, vertical operational video, vertical height video and you name it. Our Chicago Center people think you'd like to read their new brochure describing the handy little breadbox-size unit.



Without doubt the last troposcatter communications system you eyeballed was merely an extension of line-of-sight techniques. It relied on "brute-force" power, had several gigantic antennas (or antennae, for you purists), and wasn't very versatile. Well, now you can blot that ugly image from your quivering subconscious. Motorola's Chicago Center is designing and building (for the Air Force) a tactical lightweight microwave-troposcatter system that will be, according to our guys, "a digital, multi-channelled, high order diversity system that is relatively lightweight, small and portable, has a very low power drain, but one antenna, and one low power transmitter. Let's hear it for the boys in Chicago!

*Write to the appropriate Center if you'd like to be deluged with more information.*

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# collage 4

## New worlds, or reptiles, to conquer



As anyone who knows anything at all about small air-to-air missiles will tell you, the development of the Mk. 12 GCG radar-seeker head for the Navy's SIDEWINDER missile was no small achievement. Accolades are in order for the Naval Ordnance experts at China Lake and for our own Aerospace Center engineers who, somehow or other, managed to pack about 45 pounds of electronics into a 10-ounce space.

The trouble is, the radar-guided SIDEWINDER is operational now—has been since early 1965—and we're pushing the guidance units out the door in production quantities for the Navy. This leaves our developmental geniuses with a sort of let-down feeling now that all the big problems have been solved. What they need to perk them up is more of the same kind of challenge. After all, they've developed a pretty unique type of capability for this sort of thing and it seems a shame to let it go to waste.

So, if your copperhead or boa constrictor is slithering around in a random sort of fashion, we'd like to suggest that you send him to us for some expert guidance. Radar guidance is one of our top specialties and we'd like to tell you all about it. Unfortunately, detailed information about this is highly classified, and for

some reason DOD takes a dim view of people who go around blabbering about it in public. But, if you can establish a "need to know," we will even tell you how we could apply new integrated electronic techniques to the problem for smaller size and lower cost.

## Double Your Brightness, Double Your Range



Be the first in your set to transform that dingy old radar display into a glowing crystal ball. All it takes (besides courage) is a few Motorola radar transponders. Place them in, on, or around the people, places and things you'd like to find. Then, look into your crystal ball and—SHAZAM—there they are! Bright, hard images that not only stand out from ground clutter and weather, but, mysteriously, can be seen well beyond normal radar range.

If you'd like to astound your friends, gain a reputation as a radar wizard, or simply satisfy that nagging curiosity, write today for our free and vividly illustrated transponder brochure.

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# collage 5



## **RIC the lion-hearted also eagle-eyed and computer-brained**

RIC, as we told you once before, is an amazing little ( $3/4$  cu. ft., 38 lbs.) device that attests to the wonders of integrated electronics, the genius of our Chicago Center engineers, the money of the Air Force, and the tragedy of our times that makes it all necessary. RIC is an intercept-calculator that attaches to a radar PPI and, together with the PPI, provides an air controller with continually updated air-to-air intercept data. RIC makes accurate position determinations, keeps track of time, performs rapid and precise calculations of time, course, distance and predicted position. And it provides accurate intermediate computation of intercept trajectories. Using this information, the controller is able to position interceptors at the proper attack angle at the right time so that the pilot can make his final approach using on-board systems, including his own brain, without which RIC wouldn't be much good. We throw in that last extraneous remark to assuage the feelings of anyone who might get the idea we think pilots are becoming obsolete. Remember, today's fighter pilot is tomorrow's contract-signing general. Write to Chicago Center for more about our amazing Radar Intercept Calculator.

## **Up at the front (or down in the mouth) with the whiffle bird**

You remember the whiffle bird. Of course you do—he's that now-extinct creature that was said to have flown backwards in ever-decreasing concentric circles until he flew down his own throat (or something like that). Anyway, this creature is analogous to some of our present-day microwave design engineers who try to design up-to-date hardware but find that by the time a unit is shipped, it's already obsolete. One reason for this is that microwave semiconductors are advancing at a faster pace than most of us. Take, for example, an engineer

designing a microwave receiver front-end. Should he use a tunnel diode amplifier and tunnel diode mixer assembly? Not if he's really hip, because today a microwave transistor and hot carrier diode mixer combination will do the job much better. But, don't take our word for it; read what one of the experts has to say in a recent article entitled "Advances in Miniaturized Microwave Solid State Receivers." Authored by one of our guys, reprints are available from the Aerospace Center (you might even send a resume). Otherwise, don't blame us if you fly down your own throat.

## **A pound of sugar VS a pound of Motorola**



At the risk of appearing un-American we'd like to suggest that maybe, pound for pound, Sugar Ray Robinson was *not* the most efficient fighting mechanism ever conceived. You see, we have a middleweight (160 lbs.) radar system we're proposing for fighter aircraft, and it does a lot of things the Sugar Man couldn't. Like terrain-avoidance, ground mapping, station keeping, air-to-air search, air-to-ground ranging, missile guidance, etc. It can even have a beacon mode, and provide moving target indication. But maybe we ought to call it a draw, because we could probably learn something from Sugar Ray about homing in on Jake La Motta's jaw or Carmen Basilio's eye. In any event we'd like to tell you all about our ideas for a new airborne, multi-function radar system. Our Aerospace Center will load you up to here with details... if you don't dazzle them too much with your footwork.

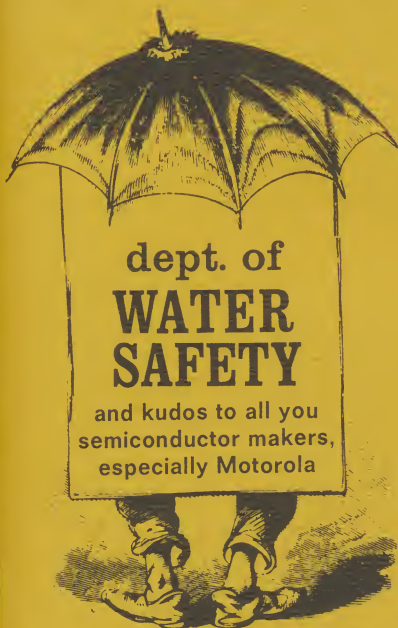
*As always, we urge you to write to the appropriate Center for more information about anything discussed here. But don't expect copies of Audubon's works or a subscription to Ring magazine.*

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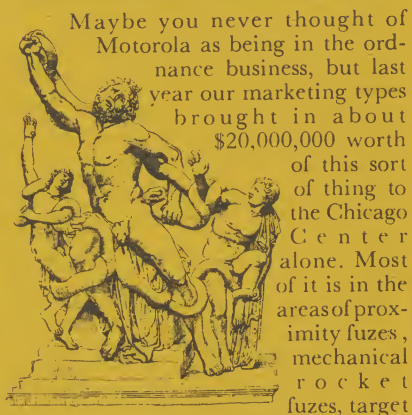


Those of you who go down to the sea in boats will be delighted to know of a new air defense system that now becomes possible by the wonders of integrated electronics. This program will lessen the likelihood of your going down into the sea in boats, at least as a result of enemy aircraft. It's a new guidance system for small surface-to-air missiles we're talking about, and its first application is to provide protection for small boats against low-flying aircraft. Without integrated circuitry we could never have made the guidance package small enough to be useful on such minute launching platforms as small boats. So, take a bow all you I/C manufacturers, even the ones we don't buy from. Anyway, this is a hybrid guidance system, which means that it combines the best features of both CW and Pulse Doppler techniques.

Normally, such a mix would require too much circuitry for the size and weight limitations of small-boat sized missiles, but, to repeat, the I/C boys bailed us out of that problem.

Our Aerospace Center will be happy to send you whatever details are available and allowable.

## Proximity is fine; togetherness something else



Maybe you never thought of Motorola as being in the ordnance business, but last year our marketing types brought in about \$20,000,000 worth of this sort of thing to the Chicago Center alone. Most of it is in the areas of proximity fuzes, mechanical rocket fuzes, target detecting devices, time booster devices, and a lot of engineering aimed at putting integrated circuitry into proximity fuzes. Those of you who sometimes doubt our sanity, should note well that we put together only the mechanical and electronic parts. The explosives are handled by a subcontractor in another state (not nirvana). Evidently *that* kind of proximity isn't necessary for us to make it big in the fuze biz.

If you have a fuzing application you'd like to discuss, get in proximity to our Chicago Center. If you can't drop in, drop them a line. They'll be glad to have you drop your explosive problems in their laps (but gently, please).



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For additional information concerning any of the Motorola products or capabilities mentioned in the preceding pages, contact the appropriate Center or, any of the following:

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## Is Paris Burning? Or is it just all that red paint?

Even if Russia doesn't show up with an SST only slightly smaller than the USS Wasp (no ethnic pun intended), the forthcoming Paris Air Show should provide some more or less interesting diversions for those of us involved in airbiz.

And you don't need *us* to tell you that The City Of Light offers exhibitors and delegates certain other rare cultural and educational opportunities not to be found back home. But, friends, if you plan to paint the town red, or at least a pale pink (no political pun intended), you'd better be able to protect yourself when you get home by documenting all those wonderful cultural experiences you purportedly had during those few minutes you weren't tied up on the exhibit floor. And yet another word of caution to those of you who are going back for the first time since WWII: that little "petite chou" you left behind 20 years ago is 20 years older, too...and may now be plump enough to be your "chou farci."\*

So as a public service, Motorola, friend of the displaced engineer, is providing an itinerary for you to memorize, and a list of items to send home to validate each stop during your "cultural" tour of Paris.

1. Visited Flea Market—send home a flea.
2. Toured Renault plant—send home a hubcap.

3. Searched and searched for best bouillabaisse in Paris—send home 8 fish skeletons.

4. Spent day of meditation at Notre Dame—send auto-graphed picture of Pat O'Brien.

5. Had onion soup at dawn in central market of Les Halles—send home a soggy crouton.

6. Spent day at History Dept. of Sorbonne, learning, among other things, that in Roman times Paris was known as Lutetia. Wasn't called Paris till around 300 A.D., just because a tribe known as Parisii lived there—send home any species of Gallic parasite.

7. Visited the Motorola Government Electronics Division's booth #29. There you were absolutely enthralled watching our high speed, non-impact teleprinter spurt forth hard-copy readout at 3000 wpm, 80 characters to the line. Also you saw a selection of Motorola radar transponders that were awfully nice to look at, even though they just sat there. Finally, you were entranced with our line of VHF and UHF ground-air-ground transmitters, receivers, and transceivers that are remarkably small, light, and completely solid-state. We will be happy to mail literature on this hardware to your home address so there will be little doubt you behaved yourself with utmost decorum. We might even add a note thanking you for spending so much time at our booth.

Understand, now, we're not *recommending* you go out and see if there's still a spark of life in those old bones. We're just trying to protect you if you do. Likely as not, you'll give it up after the first few hours and will truly want to spend the rest of your time in the snug, homelike environs of the Motorola booth.\*\*

We'll be looking for you.

\*stuffed cabbage

\*\*On the other hand, should you decide that la vie Parisienne is the only way to go, you can always get in touch with us at our European headquarters in Brussels (10 Avenue Hamoir; tel. 74 08 82).

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# collage 8



## AFCEA in my dreams

(or, is just getting by really enough?)

Well, here it is AFCEA time again. Time to touch up the old exhibit booth and trundle off to Washington, where things won't be too much different from last time. Oh, there'll be some nice new products to show, a few "breakthrough" type papers delivered, some monumental jobs swapped (as one executive-type said, "I go from one crumbling pinnacle to another, but ever higher"). But essentially, the grand American tribal rite of the trade show/convention will be performed in its traditional style.

However, some of you may be new to this sort of thing. Maybe you've never been to a WESCON, or a SOU'EASTCON, or even a previous AFCEA. Maybe you don't know how to make yourself become a very important person, or how to be a successful free-loader. Remember, you have three glorious days in which to parlay your relative anonymity into whatever image you wish to create for yourself. COLLAGE, an old hand at this sort of thing, will now give you a few pointers.

If it's intellectual respectability you're looking for, get into the middle of a conversation with an R&D chief from Ft. Monmouth, Bell Labs, or some such place and direct the conversation to some oblique subject you've boned up on just for the occasion... say, the bulk differential negative resistance effect in electroacoustic amplifiers (see "Beyond Integrated Circuits," by N. G. Sakiotis, in the *Motorola Engineering Bulletin*, Volume 15, No. 1, 1967). If the going becomes a bit sticky, or out of control entirely, show an attitude of bemused tolerance. Shrug, turn your palms upward, and say, "Well, really, what does anyone actually know about anything?" Never venture an opinion, but **appear** to disagree in certain matters, like politics, but do it creatively. Practice this line: "Well, I actually didn't vote for Nixon, but now Johnson's in, who can dispute Eisenhower's rationale, though it's hardly

Keynesian." This approach, if it doesn't keep you one up, will at least make you the equal of most adversaries.

Of course, intellectual respectability isn't everything. You've got to be fed and entertained in the manner to which you'd like to become accustomed. Toward this end, COLLAGE recommends you register for the show under several different names and job titles. Make sure one badge has your own name and affiliation on it, for emergency use only. Then register as the president of a fictitious European air frame manufacturer who, you let it be known, is looking for American vendors for everything from jet engines to titanium. Another should be made out as Chief Purchasing Agent for the largest prime contractor you can think of at the moment. Another should read "Final Approver, All Government Contracts in Excess of One Million Dollars," and so on. Here's a real chance to show some imagination. And don't worry about exposure. Most everyone else is as insecure as you. You wouldn't, for instance, walk up to someone on the convention floor, grab him by the tie and say, "Pardon me, sir, but you are **not** Robert McNamara," would you?

But the best way to seem intellectual, and maybe even get a free cup of coffee, is to hang around the Motorola booth (#231-232). You can look at our line of handy dandy radar transponders, or watch our display of surveillance radar systems and say, "Hmmm, that's the gear that's proving out so well on the Grumman Mohawk in Viet Nam, isn't it?" Or you could look at our TP-4000 non-impact teleprinter and say, "Looks as if that baby will do about 3000 words per minute of silent, 80 characters to the line, printing. Probably could use a bundle of them for my time-shared computer system." And so on. You can be sure we'd never expose you.



O.K., now you're on your own... and if you get in trouble, you can find sanctuary in Motorola's booth. We're nice people, and have been in so many shows, we don't have to act phony. Drop by and see for yourself.

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# MOTOROLA

## Government Electronics Division

## and yet more ways to talk to GREAT IRON BIRDS



Here we go again, announcing more exquisite black boxes for ground-to-air communications. This time it's our CM-510 and CM-520 Transceivers (VHF and UHF, respectively). Both are all-solid-state, 20-watt units (80 watts peak), and feature integrated electronic digital frequency synthesizers to produce their 1360 and 3500 channels. They weigh in at 40 pounds and are automatically tuned. But don't confuse them with the CM-610 and CM-620 Receivers we talked about just recently. There's a difference, and you should write to our Chicago Center for all the details.



## New serenity for plankton strainers

How many times have you been out frolicking on a deserted beach, perhaps digging for turtle eggs or maybe straining plankton through your teeth, and then had the very kelp scared out of you by a misdirected amphibious landing party? Annoying, isn't it? And tanks play havoc with turtle eggs.

Well, now you can go on about your business in complete serenity. Motorola, you see, has this line of radar transponders — lightweight, solid state, C- and X-band units — that have been used with just about 100% reliability on most of our missile and space programs to extend the range or improve the accuracy of the tracking radar. Anyway, someone in our production department started showing off, and then we had transponders stacked up all over the place. Noth-

ing this good should go to waste, so we decided to brainstorm for new transponder applications.

As we suggested above, one of the most promising is with the Army's amphib boys. The likelihood of small boats winding up on the wrong beach can be quite high when visibility is bad, seas are rough, and there are no obvious landmarks on the beach (or anyone willing to poke his head up for a long look). But a Motorola transponder on the lead boat of each wave will send signals back to the mother ship's radar for positive positioning and control. And, a coded output from the transponder will ensure that each boat can be separately identified.

Can you think of more uses? Write to our Aerospace Center, they'll give you some ideas... and they won't kick sand in your face.

## THE NAME GAME

...tropospherically and multiplexitudinously speaking. You probably think that made-up names are only for consumer products... GL-70, Platformate, Fluoristan, V-7 and the never-to-be-forgotten Irium. Well, we have one too, DELTAPLEX; and don't get funny Mr. Proctor or Gamble, it's trademarked. Deltaplex came by its name honestly, though, from delta modulation and multiplex. And it is a new approach to multi-channel transmission over tropospheric scatter and line-of-sight microwave systems. It is designed for long-haul, multi-channel troposcatter or microwave systems, with up to 96 channels handled over tropo, and up to 300 channels through interconnecting microwave links. Finally we might as well confess that the system is really called DELTAPLEX MARK II, which is a bit embarrassing since no one will tell us what happened to Mark I... or if there ever was one, for that matter. You might write to our Chicago Center; they'll have to tell *you* the whole story.

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How many times have you been out frolicking on a deserted beach, perhaps digging for turtle eggs or maybe straining plankton through your teeth, and then had the very kelp scared out of you by a misdirected amphibious landing party? Annoying, isn't it? And tanks play havoc with turtle eggs.

Well, now you can go on about your business in complete serenity. Motorola, you see, has this line of radar transponders — lightweight, solid state, C- and X-band units — that have been used with just about 100% reliability on most of our missile and space programs to extend the range or improve the accuracy of the tracking radar. Anyway, someone in our production department started showing off, and then we had transponders stacked up all over the place. Noth-

ing this good should go to waste, so we decided to brainstorm for new transponder applications.

As we suggested above, one of the most promising is with the Army's amphib boys. The likelihood of small boats winding up on the wrong beach can be quite high when visibility is bad, seas are rough, and there are no obvious landmarks on the beach (or anyone willing to poke his head up for a long look). But a Motorola transponder on the lead boat of each wave will send signals back to the mother ship's radar for positive positioning and control. And, a coded output from the transponder will ensure that each boat can be separately identified.

Can you think of more uses? Write to our Aerospace Center, they'll give you some ideas... and they won't kick sand in your face.

## THE NAME GAME

... tropospherically and multiplexitudinously speaking. You probably think that made-up names are only for consumer products... GL-70, Platformate, Fluoristan, V-7 and the never-to-be-forgotten Irium. Well, we have one too, DELTAPLEX; and don't get funny Mr. Proctor or Gamble, it's trademarked. Deltaplex came by its name honestly, though, from delta modulation and multiplex. And it is a new approach to multi-channel transmission over tropospheric scatter and line-of-sight microwave systems. It is designed for long-haul, multi-channel troposcatter or microwave systems, with up to 96 channels handled over tropo, and up to 300 channels through interconnecting microwave links. Finally we might as well confess that the system is really called DELTAPLEX MARK II, which is a bit embarrassing since no one will tell us what happened to Mark I... or if there ever was one, for that matter. You might write to our Chicago Center; they'll have to tell *you* the whole story.

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# MOTOROLA

## Government Electronics Division

# collage 10

## Our Gee Whiz



### ...elegant but unloved

It has been a constant source of annoyance to us that whenever people talk about SGLS (and it is a frequent topic now in nearly every American household, isn't it?), they don't spend nearly enough time on the "G" part of it, which is, of course, the part we build. All they ever say are things like, "Golly, isn't that Air Force Space-Ground Link System an elegant concept?" Never a word about Motorola's telemetry, ranging and command equipment, without which SGLS couldn't function as a radio communications link between space vehicles and the ground. And there's no consideration of the fact that one of the reasons (prime) Philco selected us is because we've done the same sort of thing for NASA's Deep Space Instrumentation Facility and Manned Space Flight Network. Anyway, you'd make our Aerospace Center feel a lot more appreciated if you'd direct the conversation tomorrow morning at breakfast to their glorious G capabilities. Or, better yet, write for details.

## dept. of Moving Moon Pictures

and yet more sympathy for us,  
the forgotten sub

All right, all right, the pictures we've been getting back from the moon are just great. Anyone who doesn't know that must have been doing a solitary confinement stretch in the Orkney Islands state pen. But how many of you know that all those wonderful pictures would be wandering aimlessly out in space if it weren't for our communi-

cations transponders on the Lunar Orbiters. We've gone to great lengths to provide NASA and RCA with the world's best CW transponders, heart of spaceborne communications links, that make possible command and tracking functions, and provide a low power transmitter for sending back telemetry data... not the least of which are those moon pictures. We've been quietly designing and building these systems for many moons, now — as witness the previous successes of Ranger and Mariner. Reliability has been 100%, we might add, and that's probably our whole problem. We have no doubts that you'd have heard plenty of Motorola's role in space exploration if we'd ever had a piece of our gear malfunction. Well, that's space biz.

### meanwhile, back in the atmosphere, **MOTOROLA** aids

Aids what, or whom, you may ask. Planes, that's what. But actually, AIDS is just another acronym, standing for Aircraft Integrated Data System. When completed, though, no large and complex aircraft should be without one. What the system consists of is an onboard aircraft monitoring and checkout system that makes possible the rapid acquisition and display of more kinds and more precise



information about the operation and condition of the aircraft, aircraft systems and aircraft components. All of which will result in improved flight safety, more efficient flight operations, and increased maintenance efficiency. We have developed some unique methods of acquiring the data, converting it from analog to digital, transferring it to a processor, smoothing and reducing it, and finally presenting it in useful form... right away... to both operational and maintenance personnel. On something like an SST, which will go so fast that in-flight movies will have to be Pete Smith shorts, time is of the essence. And this will be the sort of thing AIDS will best aid. If you happen to be building an SST in your garage you really ought to write to our Aerospace Center for the full story. We won't reject any mail from Seattle, either.

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**Government Electronics Division**





## HOW HIGH THE HYBRID

Since Motorola is not a Hughes, JPL or NASA, we have to scrounge for every little bit of glory we can get in the space exploration business. Sure, most of *you* know that none of the multitude of U. S. space flights would have been successful without our CW transponders, command receivers, command & guidance systems, telemetry systems, and so forth. But Huntley hasn't exactly been tripping over Brinkley, Cronkite or Bergman trying to get us to hold a press conference after each space success. So, as we said, we have to jump on each little chance for notoriety we can find. With this belabored prefix, then, don't make sport over our joyful pride as we tell you (trumpet fanfare): **THE FIRST HYBRID INTEGRATED CIRCUITS ON THE MOON WILL BE MOTOROLA'S!** That'll be during the next Surveyor shot, and the circuits we're raving over are in the Voltage Controlled Oscillators. Our Telemetry Engineering people are quite proud of this achievement, and if you'd write to our Aerospace Center they'd be delighted to tell you how they brought it off.



**Dept. of Renegery**

... plus a free plug for the Bell System, as if they need it.

A while back we promised we'd never again mention our fabulous TP-4000 non-impact teleprinter that spews out 3 or 4 thousand wpm of 80 characters per line (64 character alphabet), is small and silent, and hooks onto just about any computer you might have lying

about. Well, now we have a new capability for it, and must renege on our promise. Now you can use a TP-4000, getting hard-copy readout, over a Data-Phone voice channel while using the full capacity of the channel. The Bell System's 201 and 202 Data-Phones are the units to use, and tell Bell we said it is o.k. to toss in a TP-4000 with each of their units. If Bell gives you any static (no pun intended) tell them you'll use one of our microwave data transmission systems instead of their telephone lines. In the meantime, write to our Chicago Center for a beautifully illustrated, lustfully-written brochure on the TP-4000.

## Five million frequencies Can't be wrong ... a challenge to nitpickers and/or Hertzcounters



Our engineers claim it's true, and we're in no position to doubt them. But somewhere out there in magazineland there must be someone just fussy enough to challenge this claim of theirs: we now have a wide variety of precision frequency synthesizers that are all solid state, digital and analog, many with integrated circuitry, and with a capability of up to 5 million frequencies spaced at 1 Hz intervals, 85 db spurious signal attenuation, and frequency stability of 2 parts in  $10^8$ .

What we mean is, if you're in the business of making military and/or non-military communications hardware, the implications of this announcement are staggering, aren't they? So why don't you demand a demonstration? Try and find one with only 4,999,999 frequencies and call it to our attention (not the Better Business Bureau, please). That'll take some of the smugness out of our Chicago Center engineers.

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**MOTOROLA**

**Government Electronics Division**

# collage 12

## Our Mysterious Millionaires In Chicago



Our Chicago Center people demanded equal time with Aerospace Center when they found out we were promoting the ordnance capabilities of Motorola. But the trouble is, they don't have too much they can talk about without getting into hot water with the security people. So, if the following is not as clear as you'd like it to be, don't think we're being devious out of some innate perversity; better veiled than jailed, we always say.

Most of the Chicago Center fuze activity is in production. Though, like their Aerospace Center counterparts, there is quite a bit of R&D action going on in integrated circuitry applications. They're making, for the most part, rocket fuzes, booster assemblies, mortar proximity fuzes, electronic sensing elements for proximity fuzes and a few other things we'd like to talk about, but you never know who is listening.

Anyway, whatever it is they are doing, they must be doing it well, because the business has been worth about \$20 million in the last year or so (contract dollars, not profit dollars, Mr. IRS).

And while we're talking in terms of millions, it should be noted that our Chicago Center has an Army contract to fabricate, test and deliver nearly \$2.5 million worth of fuze booster assemblies. If you have a million of *anything* you'd like us to build, test and deliver, be sure to let our ordnance experts hear from you.

## Coming Soon the Electronic Anarchist



Fuzes, back in the days when life was a whole lot simpler, were those things hanging out of bowling-ball type bombs, without which no self-respecting anarchist would be seen on the streets.

Well, things are much more sophisticated today, and you're probably wondering what a self-respecting electronics company like Motorola is doing in the fuze business. To that we say, hah! Don't you know that the fuze business is the electronics business?

Motorola has been at it since the early 60's. Most of it has been R&D in the field of proximity, or active radar, fuzes. And we've developed everything from surface-to-air missile intercept systems to small, relatively simple munitions fuzes. Just recently the Aerospace Center was awarded a large production contract for the Air Force FMU-56 bomb fuze.

But being an electronics company has given us a special edge in applying integrated circuitry techniques to fuzing, especially as the need has increased for getting more and more functions into smaller and smaller packages. Our latest tour de force is a tiny little "radar set"... small enough to fit in the nose of a 40 mm shell, or for that matter in the nose of a small anarchist. Our Aerospace Center will be pleased to continue this discussion, if you'll give them half a chance.



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# collage '67



COLLAGE '67 . . . madness to the twelfth magnitude. Proving once and for all that technical advertising need not be a bloody bore . . . or make any sense at all, for that matter.

Motorola has always clung to the perhaps naive view that its products . . . as shining and magnificent as they are . . . should not necessarily be described in terms reserved for things like motherhood, the flag and the big Thanksgiving day football game. After all, a system is a system, and a black box is a black box . . . however important it is to us and the people who buy them from us. With this in mind we developed an advertising campaign called COLLAGE (a random collection of bits and pieces). There, we've been talking about our products in a light hearted manner, even adopting an irreverent tone on occasion, because we feel that its about time someone did something to relieve the boredom that charac-

terizes so much of today's technical advertising.

The response has been surprisingly good. Business has been good, too. And if COLLAGE can't take much credit for the sales increases, at least it can't be blamed for any losses. Anyway, people have been writing for extra copies of these advertisements, so we decided to put the first twelve together in this little booklet.



If you're not a regular reader of *Aviation Week*, where the ads first appeared, these reprints may offer some items of interest and/or amusement to you. If you are concerned with communications, radar, transponders, electronic warfare and other things we ramble on about, we hope you'll get in touch with either of our two operating Centers, or one of our Regional Offices listed on the back. (While COLLAGE may not *look* serious, it is supposed to pique your interest.)



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